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(54) Title: FLOORING AND PROCESS FOR ITS MANUFACTURE

(57) Abrégé/Abstract:
A flooring is disclosed which has discrete surface areas which differ in the characteristics of at least one of their optical and/or physical properties. A process for the manufacture of such a flooring is also disclosed. The sequence of the changes can be arranged such that, for example, different colour shades can be used for the directing of visitors in shopping malls, hospitals, airports and public buildings. The flooring provides an aesthetically pleasing as well as functional appearance.

ABSTRACT

A flooring is disclosed which has discrete surface areas which differ in the characteristics of at least one of their optical and/or physical properties. A process for the manufacture of such a flooring is also disclosed. The sequence of the changes can be arranged such that, for example, different colour shades can be used for the directing of visitors in shopping malls, hospitals, airports and public buildings. The flooring provides an aesthetically pleasing as well as functional appearance.

FLOORING AND PROCESS FOR ITS MANUFACTURE

Field Of The Invention

The invention relates to a flooring of rubber having granulates embedded in the surface thereof which are distinguished from one another in at least one optical and/or physical property.

Background Of The Invention

DE-42 26 766 A1 discloses a multi-coloured, patterned flooring and a method of manufacture therefor, whereby a coloured granulate is embedded at an even distribution in a web of a first colour different from the colour of the coloured granulate. The web as well as the granulate are made of a cross-linkable elastomeric material. The granulate includes at least two coloured fractions of particles which have colours that are different from one another and from the first colour. The amount and colour of the fractions is selected so that upon a homogeneous mixing of all components included in the flooring, the colour of the resulting mixture is essentially the same as the first colour. During manufacture, the fractions are separately granulated, mixed and fed to a roller calender with subsequent vulcanization. This provides the optical appearance of a mixed colour surface consisting of coloured surface portions of 1 to 25 mm^2 which are embedded in the surface of the flooring. This permits the full recycling of all flooring waste portions which are generated during manufacture of the flooring, whereby the shade of the flooring is additively determined by equal portions of the differently coloured components included therein. However, it is often desired to have a flooring with discrete surface areas which differ from the remainder of the flooring in at least one optical and/or physical characteristic.

Summary Of The Invention

It is an object of the invention to provide a flooring with discrete surface areas which have the same optical and/or physical properties but different in at least one characteristic of those properties, for example, for the guiding of visitors in hospitals and public buildings as well as for the identification of discrete working areas in institutional and commercial set-ups. It is another object to provide a

flooring with surface areas with different characteristics relative to the physical and/or optical properties with a continuous and gradual transition from one area to another.

Accordingly, the invention provides a flooring made of rubber, and consisting of a web having a caoutchouc granulate embedded therein, the granulate having a particle size of 0.1 to 40 mm, whereby the flooring has areas of anisotropic properties in longitudinal and transverse direction, the characteristic of at least one selected physical and/or optical property of the flooring changing at least once over the extent of the flooring surface, this change in the characteristic of said property into another characteristic of the same property being gradual. The advantages of such a gradual transition are described in more detail in the following with respect to individual embodiments.

Detailed Description Of The Invention

A flooring in accordance with the present invention is made of rubber material and in the shape of a web having a surface into which a caoutchouc granulate having a particle size of 0.1 to 40 mm is embedded according to the desired overall thickness of the flooring and the desired optical appearance. The flooring includes areas of anisotropic properties in parallel and transverse to the machine direction. The characteristic or measurable physical value of at least one selected physical and/or optical property of the flooring gradually changes into another characteristic or measured value of the selected property, whereby this transition is preferably periodically repeated. The continuous and gradual transition of the characteristic is thereby determined by the type and amount of the embedded granulate.

In a preferred embodiment of the invention, the gradual transition in the physical and/or optical characteristic between the surface area portions occurs transverse to the machine direction of the web. This variant is preferred, since it is especially easy to manufacture and no special procedures need be followed during installation of the flooring.

If one focuses on the gradual transition of the optical characteristics of the different surface areas, for example, the brightness of the flooring area, aesthetically pleasing effects can be achieved which can be used especially advantageously in presentation areas such as exhibition halls, and shop windows.

The same can be said for the degree of reflectivity, the intensity of which is preferably higher in the flooring surface of presentation areas than in areas frequented by the public where a shine would give the impression of an unduly slippery floor covering or where wearing of the shine by foot traffic would change the appearance of the flooring in an unacceptable manner over time.

A pleasing optical appearance can also be achieved with periodically repeating changes of the colour shade of the flooring surface. Furthermore, the sequence of the changes can be arranged such that the different colours can be used for the directing of visitors in shopping malls, hospitals, airports and public buildings. For example, the visitor would be optically prompted of his imminent entry into another area of the building.

In all mentioned cases, the optical appearance of the flooring can be further enhanced or varied by appropriate illumination. Furthermore, it is possible to provide gradual transitions in the characteristics of more than one property such as reflectivity, brightness and colour. This allows countless design possibilities in practical and artistic respects.

In a variant of the invention, the selected property which is changed is the electric resistivity of the flooring, measured according to DIN 51 953. The resistivity is continuously varied within the limits of 1×10^3 to 10^{10} Ohm. For example, for the production of integrated circuit boards, the floor covering around the production areas is made electrically conductive to avoid the electrostatic destruction of electronic components being handled by the assembly workers. Thus, the workers are always in electrical contact with the floor covering. In view of the spacial limitation of the working areas, it is not required to provide the whole floor covering

of a production area with electric conductivity. However, in order for the employees to be able to readily identify the electrically conductive areas, it is intended in accordance with the invention to provide a floor covering wherein the areas of electric conductivity are further provided with gradual variations in the characteristics of at least one optical property. These variations can be used to indicate the gradual transition to the non-conductive zones of the flooring. This can be optically identified by changes in colour, brightness, or reflectivity. The advantage over an abrupt delimitation, for example, lies in that the working area to be used by the assembly workers handling the electronic components does not appear overly confined. Apart from this psychological effect, it is preferably also guaranteed that even in a zone further away from the work space, the flooring still has a resistivity which is technically no longer optimal but still sufficiently low so that there is a certain degree of security that electronic components can be handled without destruction in that area.

Another embodiment of the invention is directed a flooring wherein the selected property is the surface roughness of the flooring whereby the flooring has flowing transitions in the roughness of individual zones of the flooring surface. This is advantageous in areas potentially subjected to wetness or humidity in order to reduce the danger of slipping. An example would be the area of a pool between the wet zone and the entrance where a greater slipping safety upon wetness is no longer required. The roughness in these zones would thereby gradually increase or decrease analog to the humidity carried along.

The process in accordance with the invention is carried out by spreading onto a still soft and elastic, continuously moving web prior to the vulcanization thereof at least two different types of caoutchouc particles of a particle size or sieve fraction of 0.1 to 40 mm. The particle size is thereby dependent on the desired properties of the floor covering and the desired final thickness of the flooring. Suitable values within a selected range are thereby easily determined by pre testing and the effects thereof on the surface properties can be measured.

In accordance with the invention, at least two particle fractions are used, the physical and optical properties of which are distinguished in relative value from each other. These properties can be, for example, the brightness, reflectivity, colour shade, electrical conductivity or resistivity and surface roughness of the flooring.

It is also desirable for added safety at the workplace to produce a floor covering the surface of which includes embedded particles which, due to their brightness, define a broad not abruptly delimited emergency guide surface upon a power failure and, thus, total darkness.

The caoutchouc particles are placed in a feed funnel which is upwardly and downwardly open and on the surface of a dosing roller located below the funnel. The longitudinal axis of the dosing roller extends perpendicular to the transport direction of the soft, elastic web. The circumference of the dosing roller moves in parallel to the transport direction of the web. Particles in the feed funnel flow into the gap between the bottom opening of the funnel case and the surface of the dosing roller upon rotation of the dosing roller. The width of this gap is defined by adjustable brush rakes. The surface of the dosing roller is provided with a multiplicity of axially extending grooves and recesses which are of differing depth and are staggered relative to one another, and which are filled by the caoutchouc particles. These grooves also function as storage containers from which the caoutchouc particles are fed to the surface of the caoutchouc web according to the positioning, depth and number of the grooves.

The difference in depth, the number and the positioning of the grooves parallel to the roller axis is not limited in any way. These grooves or depressions are easily manufactured so that the respectively optimal construction for desired flooring surface appearances can be easily developed through testing. The web including the particles is then subjected to one of the well known methods available for vulcanization of the web to achieve a finished floor covering.

Changes and modifications in the specifically described embodiments can be carried out without departing from the scope of the invention which is intended to be limited only by the scope of the appended claims.

C L A I M S

1. Flooring made of rubber material, and consisting of a web having a caoutchouc granulate embedded therein, the granulate having a particle size of 0.1 to 40 mm, whereby the flooring has areas of anisotropic properties in longitudinal and transverse direction, the characteristic of at least one property selected from physical and optical properties of the flooring changing at least once over the extent of the flooring surface, the change in the characteristic of said selected property into another characteristic of the same property being gradual.

2. Flooring according to claim 1, wherein the gradual change of said characteristic is achieved transverse to the direction of manufacture of the flooring.

3. Flooring according to claim 1 or 2, wherein a selected property is the brightness of the flooring.

4. Flooring according to claim 1 or 2, wherein a selected property is the degree of reflectivity of the flooring.

5. Flooring according to claim 1 or 2, wherein a selected property is the colour shade of the flooring.

6. Flooring according to one of claims 3 to 5, wherein the electrical resistivity of the flooring according to DIN 51 953 varies between 1×10^3 Ohm and 10^{10} Ohm.

7. Flooring according to one of claims 1 to 5, wherein a selected property is the surface roughness of the flooring.

8. Method for the manufacture of a flooring made of rubber, comprising the steps of providing a still soft and elastic, continuously movable web prior to the vulcanization thereof; spreading onto said web at least two different types of

caoutchouc particles sharing a physical and/or optical property but having different characteristics of that property, the particles having a particle size or sieve fraction of 0.1 to 40 mm; feeding the particles through a feed funnel onto a surface of a dosing roller positioned under said funnel and above said web, said dosing roller having an axis perpendicular to a longitudinal direction of said web and rotating in direction with the movement of the web; passing the particles by rotation of the roller through an adjustable brush rake defining the size of a gap between a lower end of the feed funnel and the roller surface; holding the particles in a plurality of staggered grooves in the surface of the roller during the transport of the particles on the roller; depositing the particles onto the web under the roller, the grooves having different depth and volume and extending parallel to the axis of the roller, and subsequently subjecting the web with the deposited particles to a vulcanization to produce a finished flooring having discrete surface areas which differ in the characteristics of at least one of their optical and physical properties.